

ANNALS OF THE SOUTH AFRICAN MUSEUM
ANNALE VAN DIE SUID-AFRIKAANSE MUSEUM

Volume 102 Band
November 1992 November
Part 4 Deel



TWO NEW SPECIES OF OIL-COLLECTING
BEES OF THE GENUS *REDIVIVA* FROM THE
SUMMER RAINFALL REGION OF
SOUTH AFRICA
(HYMENOPTERA, APOIDEA, MELITTIDAE)

By
V. B. WHITEHEAD
&
K. E. STEINER

Cape Town Kaapstad

The ANNALS OF THE SOUTH AFRICAN MUSEUM

are issued in parts at irregular intervals as material
becomes available

Obtainable from the South African Museum, P.O. Box 61, Cape Town 8000

Die ANNALE VAN DIE SUID-AFRIKAANSE MUSEUM

word uitgegee in dele op ongereelde tye na gelang van die
besikbaarheid van stof

Verkrygbaar van die Suid-Afrikaanse Museum, Posbus 61, Kaapstad 8000

OUT OF PRINT/UIT DRUK

1, 2(1-3, 5-8), 3(1-2, 4-5, 8, t.-p.i.), 5(1-3, 5, 7-9),
6(1, t.-p.i.), 7(1-4), 8, 9(1-2, 7), 10(1-3), 11(1-2, 5, 7, t.-p.i.),
14(1-3), 15(4-5), 24(2, 5), 27, 31(1-3), 32(5), 33,
36(2), 43(1), 45(1), 67(5), 84(2)

Copyright enquiries to the South African Museum

Kopieregnavrae aan die Suid-Afrikaanse Museum

ISBN 0 86813 136 9

Printed in South Africa by
The Rustica Press, Pty., Ltd.,
Old Mill Road, Ndabeni, Cape

In Suid-Afrika gedruk deur
Die Rustica-pers, Edms., Bpk.,
Old Mill-weg, Ndabeni, Kaap

TWO NEW SPECIES OF OIL-COLLECTING BEES OF THE GENUS *REDIVIVA*
FROM THE SUMMER RAINFALL REGION OF SOUTH AFRICA
(HYMENOPTERA, APOIDEA, MELITTIDAE)

By

V. B. WHITEHEAD

Entomology Department, South African Museum, Cape Town

&

K. E. STEINER

National Botanic Institute, Kirstenbosch, Claremont

(With 9 figures and 4 tables)

[MS accepted 25 May 1992]

ABSTRACT

Two species of oil-collecting bees of the genus *Rediviva* are described from the summer rainfall region of southern Africa. *Rediviva pallidula* is a high-altitude bee that closely resembles *R. neliana* Cockerell, but is distinguished by its paler pubescence on the leg extremities and metasomal terga and by differences in the shape of sternum seven and genital capsule among males. Females collect oil from six *Diascia* species (Scrophulariaceae) and two species of terrestrial orchids. *Rediviva saetigera* is the only oil-collecting bee in the summer rainfall area with short tarsomeres 2, 3 and 4 on the front legs of the female, and with modified hairs for collecting oil on the front basitarsus and tibia only. There are also distinctive long pollen-collecting hairs on the frons of females. The oil hosts of *R. saetigera* are two species of shrubby trees, *Bowkeria cymosa* MacOwan and *Anastrabe integerrima* E. Meyer ex Benth. (Scrophulariaceae), the former occurring on the eastern Transvaal escarpment and the mountains of Swaziland and the latter in coastal forests from East London to northern Natal and Moçambique.

CONTENTS

	PAGE
Introduction	143
Methods	144
Descriptions	145
<i>Rediviva pallidula</i> sp. nov.	145
<i>Rediviva saetigera</i> sp. nov.	155
Acknowledgements	164
References	164

INTRODUCTION

We have been investigating the relationships between oil-collecting bees of the genus *Rediviva* and their oil and nectar host plants in southern Africa (Whitehead *et*

al. 1984; Whitehead & Steiner 1985; Steiner & Whitehead 1988, 1990, 1991). *Rediviva* bees can be conveniently grouped according to their occurrence in the summer and autumn rainfall regions of the eastern Cape and eastern Transvaal, and the winter rainfall areas of the western Cape. Bees from these two regions do not overlap either temporally or geographically.

In the winter rainfall region there are four described species—*R. peringueyi* (Friese), *R. intermixta* (Cockerell), *R. longimanus* Michener, and *R. emdeorum* Vogel & Michener (Michener 1981; Vogel & Michener 1985), and 10 undescribed species (Whitehead & Steiner in prep). The summer rainfall group is also made up of four described species, *R. neliana* Cockerell, *R. politissima* (Cockerell), *R. rufocincta* (Cockerell) and *R. colorata* Michener (Michener 1981). *Rediviva neliana* and *R. politissima* do not differ in male genitalia nor on non-meristic characters, except colour of pubescence. At present, these two species are considered to constitute part of a single highly variable species, which may, with more detailed study, result in the recognition of one or more additional species. Two other *Rediviva* species that are readily distinguishable are described below. Although detailed morphological studies have only recently started, it would appear from data available at present that the species from these two areas form a monophyletic group. A phylogenetic analysis of the group will be included with the revision of the genus.

METHODS

Measurements were made with a calibrated eye-piece graticule, using a dissecting microscope. Forelegs were removed and mounted on card and each segment measured separately (Steiner & Whitehead 1990, 1991). Wing length is the distance from the outer edge of the tegula to the wing tip. Body length was measured from the anterior ocellus to the tip of the abdomen and, although there was some variability due to the position of the abdomen, this measurement was found to be a good estimate of body size (Steiner & Whitehead 1990). Male genitalia and the associated sterna were extracted with a bent needle after the bee had been relaxed. The genital capsule with associated sterna were macerated in cold 10 per cent KOH overnight, rinsed with water, acidified with acetic acid, rinsed again and then stored in glycerine. All dissected parts were placed in microvials attached to the relevant insect. Mouth-parts were removed after treating the whole head as outlined above. Both mouth-parts and genitalia were drawn in glycerine using a drawing tube attached to a dissecting microscope. When drawing the mouth-parts, pressure had to be applied to the coverslip to flatten some of the structures.

The terms used for the various structures are those of Michener (1981) and for the description of surface sculpture those of Eady (1968). For leg orientation we have used the terminology of Roberts & Brooks (1987), whereby the leg is considered to be a cylindrical lateral projection at right angles to the long axis of the body. The symbols S and T with the appropriate numeral are used to indicate the sterna and terga of the metasoma; S1, for example, refers to the first sternum of the metasoma.

DESCRIPTIONS

Rediviva pallidula sp. nov.

Figs 1–5

Rediviva politissima Manning & Brothers, 1986: 108–111 (*part.* —Sani Flats specimens only).*Diagnosis*

Integument black, females with brown pubescence on dorsal areas of mesosoma, on rest of the body pubescence white to pale straw-coloured. Male pubescence similar but paler. Malar space relatively long, one-quarter to one-fifth as long as wide. In areas of overlap with *R. neliana*, *R. pallidula* females can be distinguished by the presence of white pubescence on the discs of metasomal terga two, three and four; in *R. neliana* females, the pubescence on the disc of metasomal tergum four is always black. The hairs on the leg extremities of *R. pallidula* are white to pale yellow in contrast to the dark brown to black hairs of *R. neliana*. Males of the two species can be separated by the shape of sternum seven as well as differences in the genital capsule.

Type locality

Natal, Sani Pass, 2 490 m, 2929CB, collected on flowers of *Diascia integerrima* Benth. (Scrophulariaceae).

Etymology

Pallidus, Latin for somewhat paler, referring to the paler colour of the pubescence in contrast to that of *R. neliana* with which it may be confused.

Material examined

Type material. *Holotype*: SAM–HYMB0001, female, Natal, Sani Pass, 2 490 m, 2929CB, V. B. Whitehead, 16 Feb. 1986. *Allotype*: SAM–HYMB0002, male, Lesotho, Sani Top, 2 740 m, 2929CB, V. B. Whitehead, 15 Feb. 1986. *Paratypes* (46 ♀♀, 25 ♂♂)—*Cape Province*: 1 ♀, Lady Grey, Joubert's Pass, 2 140 m, 3027CB, K. E. Steiner, 13 Jan. 1985; 1 ♀, Lady Grey, Joubert's Pass, 3027CB, K. E. Steiner, 8 Jan. 1986; 1 ♀, Lady Grey, Joubert's Pass summit, 3027CB, V. B. Whitehead, 8 Jan. 1984; 3 ♀♀, 1 ♂, Ben Macdhui, 3027DB, K. E. Steiner, 12 Jan. 1984; 1 ♀, Naudesnek, 3028CA, 2 240 m, K. E. Steiner, 28 Jan. 1986; 1 ♀, Naudesnek, 3028CA, 2 370 m, K. E. Steiner, 29 Jan. 1986; 1 ♀, Naudesnek, 2 170 m, 3028CA, K. E. Steiner, 31 Jan. 1986; 1 ♂, Naudesnek, 2 280 m, 3028CA, K. E. Steiner, 19 Jan. 1989; 1 ♂, Naudesnek, 2 300 m, 3028CA, K. E. Steiner, 19 Jan. 1989; 1 ♀, 1 ♂, Naudesnek, 3028CA, V. B. Whitehead, 11 Jan. 1985; 1 ♀, 1 ♂, Naudesnek, 3028CA, V. B. Whitehead, 12 Jan. 1985; 1 ♀, Naudesnek, 2 370 m, 3028CA, V. B. Whitehead, 28 Jan. 1986; 1 ♀, Naudesnek, 3028CA, V. B. Whitehead, 19 Jan. 1989; 1 ♀, 2 ♂♂, Naudesnek, 2 480 m, 3028CA, V. B. Whitehead, 19 Jan. 1989; *Lesotho*: 1 ♂, Blue Mountain Pass, 2928AC, V. B. Whitehead, 7 Jan. 1985; 1 ♀, 1 ♂, Blue Mountain Pass, 2928AC, V. B. Whitehead, 24 Jan. 1985; 1 ♀, 4 ♂♂, Blue Mountain Pass, 2928AC, V. B. Whitehead, 25 Jan. 1985; 1 ♀, Lebelonyane Pass, 3028AA, K. E. Steiner, 14 Jan. 1985; 1 ♀, Lebelonyane Pass, 2 400 m, 3028AA, K. E. Steiner, 27 Feb. 1990; 1 ♀, 1 ♂, Lebelonyane Pass, 3028AA, V. B. Whitehead, 14 Jan. 1985;

1 ♀, Lebelonyane Pass, 3028AA, V. B. Whitehead, 27 Feb. 1990; 4 ♀♀, 1 ♂, Mapholaneng, 2828BB, K. E. Steiner, 13 Feb. 1986; 1 ♂, Mapholaneng, 2828BB, V. B. Whitehead, 13 Feb. 1986; 1 ♀, Oxbow, 2828DC, K. E. Steiner, 23 Jan 1985; 2 ♀♀, Oxbow, 2828DC, V. B. Whitehead, 23 Jan. 1985; 1 ♂, Sani Pass, 2 720 m, 2929CB, K. E. Steiner, 14 Feb. 1986; 4 ♀♀, Sani Pass, 2 720 m, 2929CB, K. E. Steiner, 15 Feb. 1986; 1 ♀, Sani Pass, 2 720 m, 2929CB, V. B. Whitehead, 14 Feb. 1986; 1 ♂, Sani Pass, 2 750 m, 2929CB, V. B. Whitehead, 14 Feb. 1986; 1 ♂, Sani Pass, 2 720 m, 2929CB, V. B. Whitehead, 15 Feb. 1986; *Natal*: 4 ♂♂, Sani Pass, 2 080 m, 2929CB, K. E. Steiner, 21 Jan. 1985; 1 ♀, Sani Pass, 2 250 m, 2929CB, K. E. Steiner, 16 Feb. 1986; 1 ♀, Sani Pass, 2 290 m, 2929CB, K. E. Steiner, 16 Feb. 1986; 1 ♀, Sani Pass, 2 440 m, 2929CB, V. B. Whitehead, 15 Feb. 1986; 1 ♀, 2 ♂♂, Sani Pass, 2 350 m, 2929CB, V. B. Whitehead, 16 Feb. 1986; 2 ♀♀, Sani Pass, 2 490 m, V. B. Whitehead, 16 Feb. 1986.

Other material (112 ♀♀, 9 ♂♂)—*Cape Province*: 4 ♀♀, Carlisle's Hoek, 3027DD; 35 ♀♀, Naudesnek, 3028CA; *Lesotho*: 6 ♀♀, 1 ♂, Blue Mountain Pass, 2928AC; 1 ♀, Lebelonyane Pass, 3028AA; 1 ♂, Makapung Dip, 2929AC; 5 ♀♀, Mapholaneng, 2828BB; 4 ♀♀, 2 ♂♂, Moteng Pass, 2828DA; 21 ♀♀ Sani Pass, 2929CB; *Natal*: 36 ♀♀, Sani Pass, 2929CD.

Description

Female

Measurement and ratios. Holotype: body 11,7 mm, forewing 10,7 mm. Other material: means given in Table 1 for 15 specimens selected at random from six different localities where possible, otherwise all specimens at particular locality used.

Integumental colour. Black, except apical one-fourth of mandibles and flagellar segments 3–10 brown; wings lightly tinted with brown; stigma and costa light brown, other veins dark brown to black; apical margins of metasomal terga T2 to T4 light brown, apical margins of sterna S1 to S4 light brown becoming translucent.

Structure. Head wider than long, 3,8:2,9 mm (type); means of head measurements from sample of the paratypes from various collection localities presented in

TABLE 1

Mean lengths (\pm SD) of forelegs, body, foreleg/body ratios and forewings of females ($n = 67$) and males ($n = 27$) of *R. pallidula* from all localities.

	Females		Males	
	Length (mm)	Range (mm)	Length (mm)	Range (mm)
Foreleg	12,2 \pm 0,49	10,3–13,3	08,9 \pm 0,25	08,8–09,3
Body	10,8 \pm 0,26	09,8–12,5	09,9 \pm 0,34	09,9–10,1
Foreleg/body	01,1 \pm 0,03	00,9–01,3	00,9 \pm 0,03	00,8–01,0
Forewing	08,8 \pm 0,15	08,2–09,3	08,2 \pm 0,24	07,9–08,5

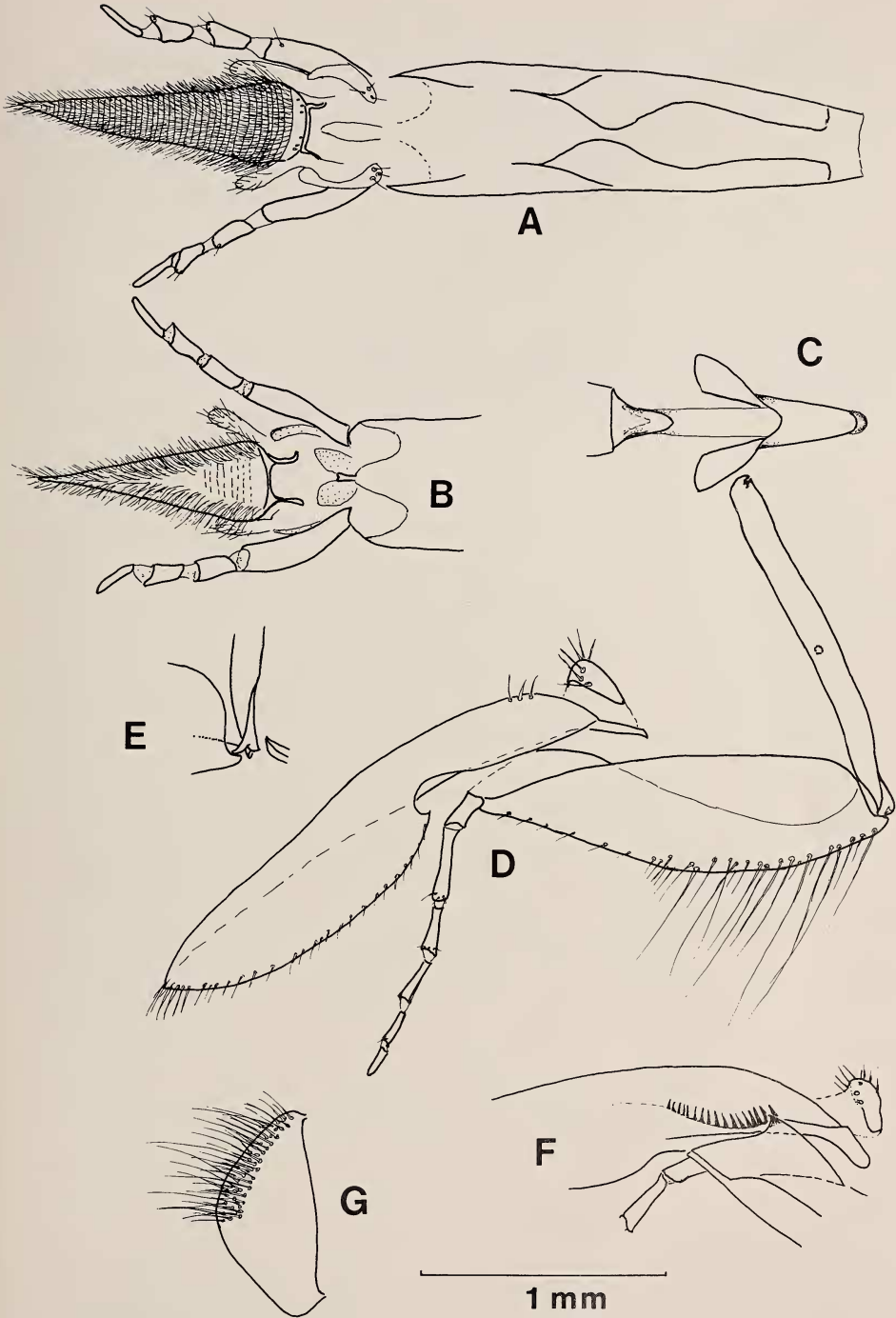


Fig. 1. *Rediviva pallidula* sp. nov. Female, mouth-parts. A. Labium, anterior view. B. Distal part of labium, posterior view. C. Fragmentum of prementum, mentum and lorum, anterior view. D. Maxilla, outer view. E. Basistipital process of maxilla. F. Inner view of maxilla to show galeal comb. G. Labrum.

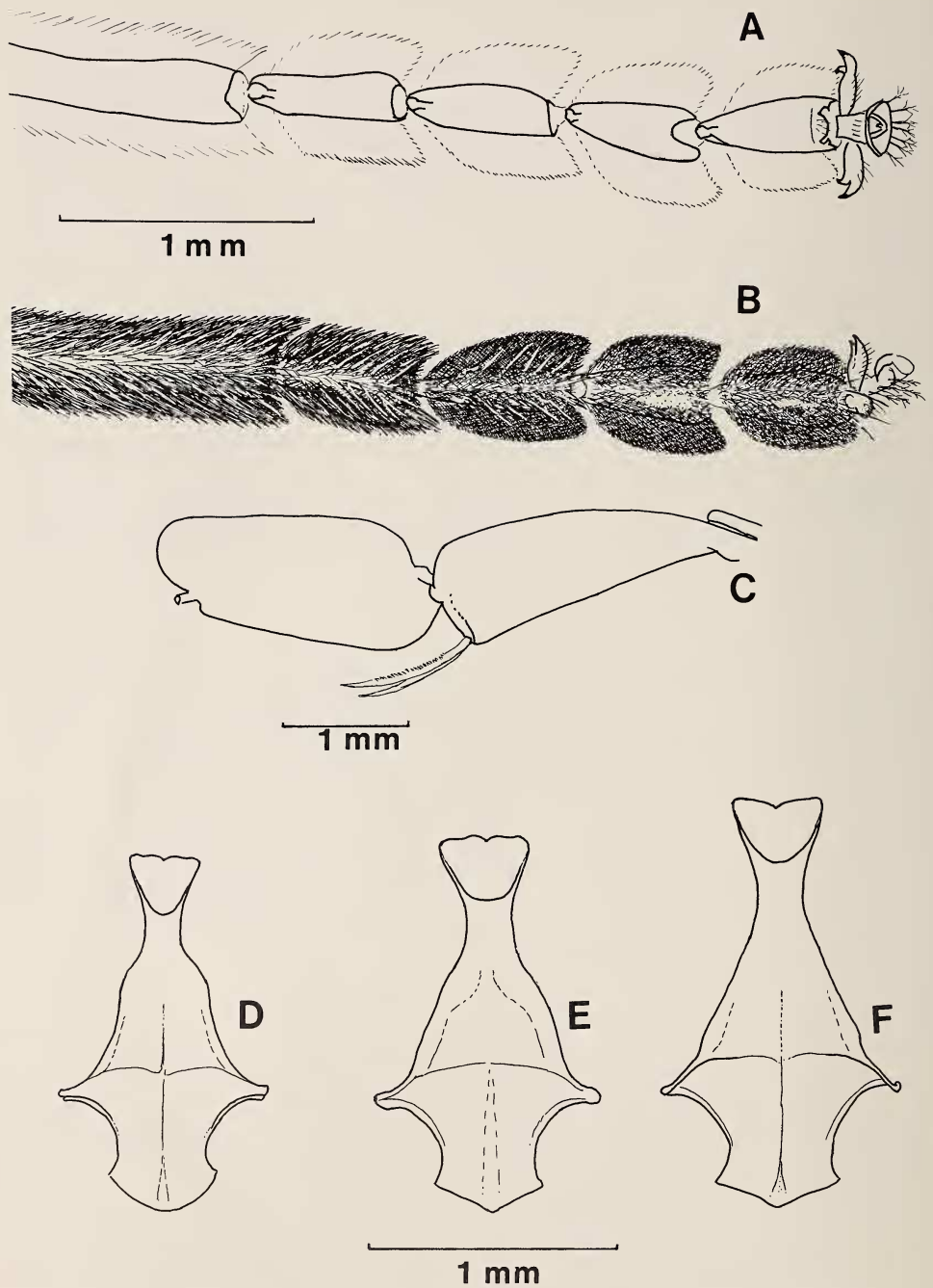


Fig. 2. *Rediviva pallidula* sp. nov. A. Ventral and B. Dorsal views of oil-collecting segments of female fore tarsus. C. Hind tibia and basitarsus of female (hairs removed). D-F. Dorsal view of S8 of males to show variation. D. S8 of male from Naudesnek. E. S8 of male from Sani Pass. F. S8 of male from Blue Mountain Pass.

Table 2; inner orbits converging above, distance between eyes greater than length of eyes, 2,5:2,3 mm (holotype), with mean of 2,5:2,2 mm ($n = 33$) for paratypes (Table 2); inner distance between lateral ocelli slightly greater than ocellocular distance (0,6 mm); malar space one-quarter to one-fifth as long as wide (holotype $L:W = 0,24$); mean $L:W$ for populations from all the collection areas in Table 2. Mouth-parts: glossa triangular, one-half as long as prementum, extending beyond labial palps; paraglossae extending one-quarter length of glossa; labial palps nearly reaching tip of glossa, basal segment one-third length of palp, terminal segment slender, well sclerotized (Fig. 1A–B); ligular arms occupying basal two-thirds of prementum (Fig. 1A); premental fragmentum, mentum and lorum as in Figure 1C; subligular process and basiglossal sclerite (Fig. 1B); cardo slightly shorter than stipes, stipes 3,5 times as long as wide, lateral margin with scattered hairs, extremely long posteriorly (Fig. 1D); basistipital process short (Fig. 1E); maxillary palp not extending beyond tip of galea, six-segmented, segments longer than wide; galea with broadly pointed apex, short hairs along apical and lateral margins (Fig. 1D), galeal comb distinct with 17 teeth (Fig. 1F); mandibles curved, strong preapical and apical tooth (Fig. 4B); labrum triangular, twice as wide as long, with dense long hairs on margin (Fig. 1G). Antennae with first flagellar segment about three-quarters length of scape and longer than segments 2 plus 3, segments 4 to 9 subequal and almost as long as broad, segment 10 twice as long as broad terminating in a shiny, oblique, slightly convex surface. Front legs long, varying from 10,3 mm to 13,3 mm, depending on collection locality (Table 1), tarsus making up about one-third of the leg length; tarsomeres 2–4 with dense, finely branched hairs on dorsal and lateral surfaces, spatulate hairs on sides of segment 2 but only at apex of segments 3 and 4 and isolated on segment 5; four terminal segments constitute oil-collecting apparatus in this species; basitarsus bearing stout unbranched hairs (Fig. 2A–B). Hind legs with tibia nearly as wide as basitarsus; basitarsus roughly ovoid, distal dorsal angle rounded, spurs pale brown, finely dentate (Fig. 2C); wings (Fig. 4A) with second submarginal cell slightly broader than long (1:0,8), receiving first recurrent vein beyond middle (20:11), third submarginal one-and-a-half times as broad as long, receiving second recurrent vein beyond middle (27:20), basal vein nearly three times as long as first abscissa of RS, meeting Cu at junction of Cu–V; jugal lobe of hind wing less than half length of vanal lobe (12:32); hamuli 11–12. Propodeal triangle small, nearly parallel-sided at apical

TABLE 2

Mean measurements (\pm SD) of head width (HW), head length (HL), interocular distance (IOD), eye length (EL) and the length/width ratio of the malar space (MS–L/W) of *R. pallidula* females ($n = 33$) and males ($n = 21$) from all localities.

	HW (mm)	HL (mm)	IOD (mm)	EL (mm)	MS–L/W
Females	3,7 \pm 0,04	3,0 \pm 0,04	2,5 \pm 0,07	2,2 \pm 0,03	0,2 \pm 0,01
Range	3,4–3,7	2,9–3,0	2,4–2,6	2,2–2,3	
Males	3,5 \pm 0,01	2,8 \pm 0,11	2,2 \pm 0,12	2,0 \pm 0,89	0,2 \pm 0,02
Range	3,4–3,6	2,7–3,0	2,1–2,4	2,0–2,1	

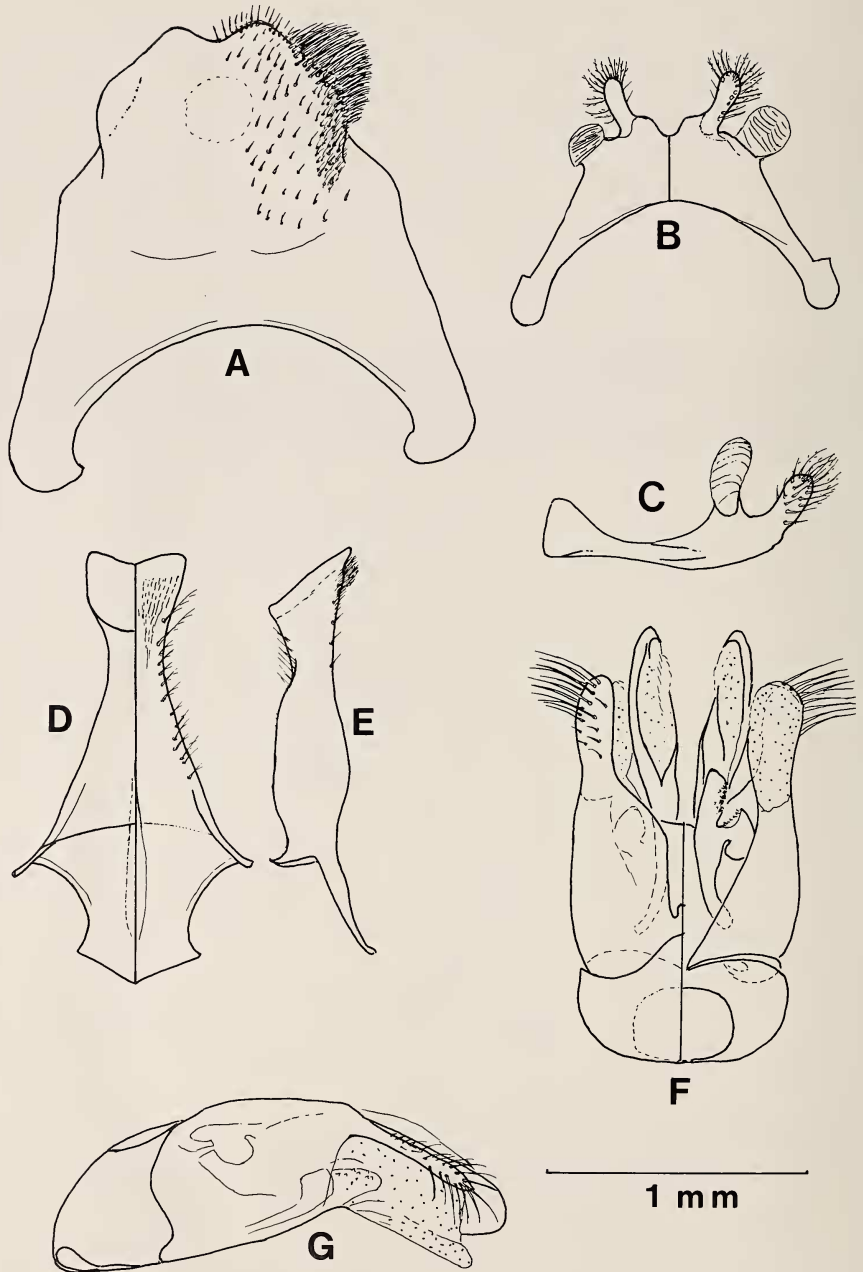


Fig. 3. *Rediviva pallidula* sp. nov. Male genitalia and terminal sterna. A. S6, ventral view. B. S7, dorsal (left) and ventral (right) view. C. S7, side view. D. Dorsal and ventral view of S8. E. S8, side view. F. Genital capsule, dorsal view (left) and ventral view (right). G. Genital capsule, side view.

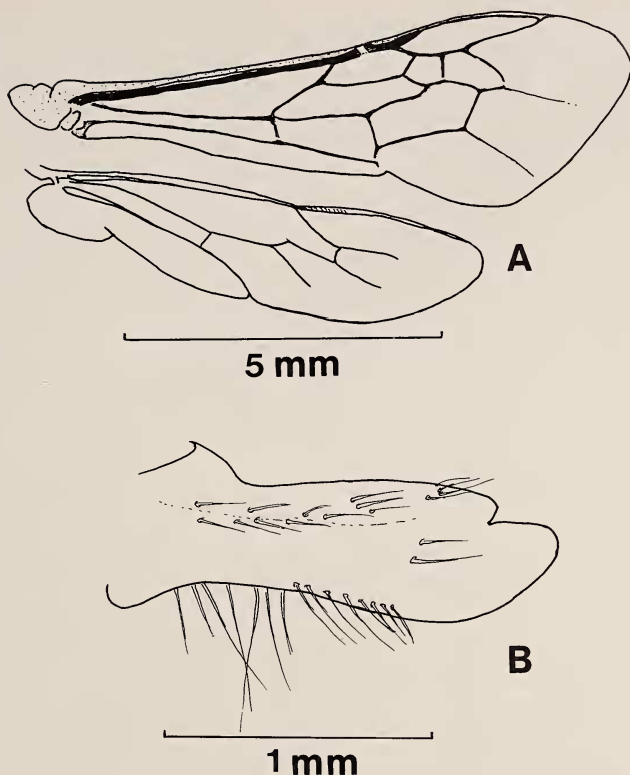


Fig. 4. *Rediviva pallidula* sp. nov. Female. A. Right wings.
B. Right mandible, outer view.

two-thirds, broadening slightly at base, shiny and finely rugose; rest of propodeal surface shiny but coarsely rugose. Apical margins of metasomal S2 to S4 concave, as is gradulus of S2. Pygideal plate dull, faintly rugose with some coarse punctures basally.

Sculpture. Head: clypeus with basal area coarsely punctate, surface between punctures shiny, punctures becoming finer and less dense towards apex, apical margin practically impunctate and finely reticulate; frons coarsely punctate either side of frontal ridge, becoming more finely punctate in para-ocular areas and towards anterior ocellus, area between ocelli and preoccipital ridge coarsely punctate; small triangular area between lateral ocelli and preoccipital ridge shiny and impunctate or with scattered fine punctures. Mesosoma: scutum finely punctate on disc, punctures coarser lateral to parapsidal line; median line distinct, extending one-third length of segment; scutellum finely punctured, coarser posteriorly and laterally; metanotum finely punctured; propodeum finely rugose, triangle shiny and faintly strigose. Metasoma: T1 shiny with fine scattered punctures on apical margin; T2, T3 and T4 shiny with denser fine punctures, T5 with coarse punctures, surface between punctures finely rugose; S2 to S5 finely punctured, areas between punctures finely reticulate, apical margins impunctate.

Vestiture. Head: brush of pale yellow hairs at centre of ridge on anterior margin of clypeus, rest of clypeus covered with strong white hairs, long unbranched pale yellow hairs on median area with a few scattered black hairs; supraclypeal and paraclypeal areas with white, finely branched hairs, scattered black hairs on paraclypeal areas; scattered dark hairs on vertex; genal area with long white plumose hairs. Meso-

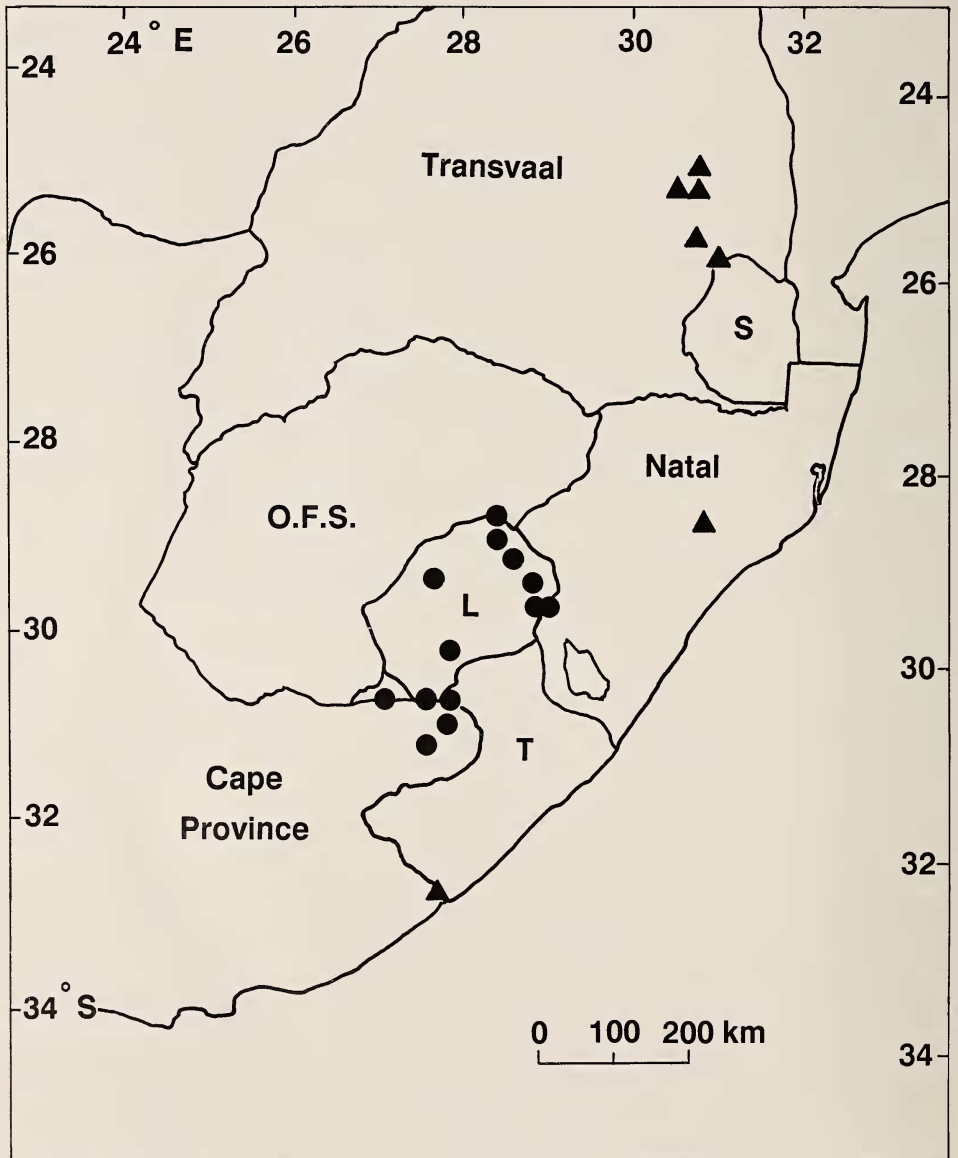


Fig. 5. Known distribution of *R. pallidula* (●) and *R. saetigera* (▲). L = Lesotho, O.F.S. = Orange Free State, S = Swaziland, T = Transkei.

soma: margins of scutum, scutellum and metanotum densely covered with light brown hair, interspersed with some dark hairs; hair shorter and more scattered on disc of scutum and scutellum; finer and more branched on propodeum except triangle which is bare; episternum and sternum covered in dense white hair; hairs on tibiae and tarsae light brown, tarsal segments 2–5 of front legs with finely branched oil-collecting hairs on dorsal and lateral areas, bare underneath; hairs on anterior area of middle legs paler with a dark patch at apex of tibia; anterior face of hind tibia and basitarsus with a finely branched mat of pale hairs through which strong pale unbranched hairs protrude; posterior face with strong unbranched pale brown hairs only; penicillum of light brown hair on distal margin of basitarsus. Metasoma: white apical hair bands on S1 to S4, fimbrium on T4 black dorsally, white laterally; white decumbent hairs basally on T2, T3 and T4, with some scattered black hairs in this area on T4; subapical band of long erect hairs on S2 to S5.

Male

Measurement and ratios. Allotype male, body 9,8 mm, forewing 8,7 mm. Means for various localities are given in Table 1.

Integumental colour. Black, except tip of mandibles, under-side of antennae, posterior surface of hind tibia, leg extremities, lateral area of T1, tegulae, costal vein, and bases of other veins piceous to dark brown.

Structure. Head: wider than long, 3,4:2,6 mm; distance between eyes 2,1 mm, eye length 1,9 mm (allotype). Means for males in Table 2. Ocellocular distance equal to distance between lateral ocelli; malar space one-quarter to one-fifth as long as wide, mean L:W = 0,2 mm; first flagellar segment more than two-thirds length of scape (27:39), slightly shorter than length of flagellar segments 2 plus 3 (27:31), segment 2 shorter than 3, segments 3–10 subequal, segment 11 slightly longer, terminating in convex, shiny oblique area. Mesosoma: forelegs not obviously lengthened, equal to or shorter than body, FL:B = 0,8–1,0 (n = 27) (Table 1); hind tibia nearly twice as wide as basitarsus (45:24); tibial spurs pale, finely serrated, basitibial plate covered with fine white hairs; prominent dorsal spur at distal end of fore tibia. Wing venation as in female, jugal lobe more than one-third length of vanal lobe (29:80). Metasoma: S2 to S5 with apical margins straight or shallowly concave at middle; S6 with disc concave, shiny, covered with short white hairs, lateral lobes with dense tufts of white hairs, apical margin emarginate, with short white hairs (Fig. 3A); short apical lobes of S7 with long hairs on apical and lateral margins; lateral lobes striated, translucent, ovate, projecting upwards (Fig. 3B–C); S8 with margin of sloping tip variable (Figs 2D–F, 3D–E). Genitalia (Fig. 3F–G): gonostyli slightly shorter than penis valves, narrow with large translucent membranous area below, apical setae straight, projecting at right angles; volsellae large with distinct teeth on opposing surfaces of digitis and cuspis, opening posterolaterally.

Sculpture. As in female on head and mesosoma, punctures coarser on sterna and terga of metasoma.

Vestiture. Head: labrum with white to straw-coloured hairs on anterior margin; longer unbranched hairs on outer and inner margins of mandibles; tufts of branched hairs on anterior ridge of clypeus, dense long white hairs on rest of clypeus, paraocular

areas, frons and genal area; shorter sparser dark hairs on vertex, scattered dark hairs along inner eye margins. Mesosoma: scutum covered with finely branched straw-coloured hairs, shorter on disc with scattered black hairs; scutellum and metanotum with long straw-coloured branched hairs; episternal areas and three basal segments of legs covered in long white branched hairs; hairs on under-side of tibia and tarsus of forelegs light brown. Metasoma: dense apical white hair bands on T1 to T6, fimbrium on T7 light brown; erect shorter and sparser white hairs basally on disc of T2 to T5, some black hairs mixed with white on disc of T3 to T5, becoming progressively denser towards apex of metasoma; sparser preapical hair bands on S1 and S3 to S6, S7 with tufts of pale brown hairs on lateral lobes; long white hairs on under-side of S8 projecting beyond the spatulate tip.

Variations

There is some variation in intensity of coloration of the brown hairs on the scutum, scutellum and metanotum in both sexes. The greatest variation is, however, in the length of the forelegs of females from the various localities and is correlated with the spur lengths of the oil-secreting *Diascia* species at a particular locality (Steiner & Whitehead 1991).

Host flower records

Nectar is not produced by oil-secreting host plants, so bees must obtain it from other plants. Both males and females take nectar from the same source, and males also patrol nectar plants in search of receptive females. Although it is the females that mainly visit the oil-producing flowers, males have occasionally been collected patrolling them, presumably in search of females. *Rediviva pallidula* females collect oil from six species of *Diascia* (Scrophulariaceae), which include *D. anastrepta* Hilliard & Burtt, *D. barberae* Hook f., *D. cordata* N. E. Brown, *D. fecaniensis* Hilliard & Burtt, *D. integerrima* Benth., and *D. stricta* Hilliard & Burtt. They also collect oil from the terrestrial orchids *Pterygodium cooperi* Rolfe and a species of *Corycium*. Nectar plants are *Lobelia preslii* A. DC., *Wahlenbergia cuspidata* v. Brehm (Campanulaceae), *Phacocapnos pruinosis* (E. Mey.) Bernh. (Fumariaceae), *Geranium multisectum* N. E. Brown (Geraniaceae), and *Stachys sessilis* Guerke (Lamiaceae).

Distribution (Fig. 5)

Rediviva pallidula is a high-altitude bee occurring from 1 830 m to 2 720 m. In the north-eastern Cape, it has been collected on Joubert's Pass at Lady Grey, and at Carlisle's Hoek, Naudesnek and Ben Macdhui in the Rhodes district and at Bottleneck Pass, Barkly East. In Natal, the species has been found just below the escarpment at Garden Castle State Forest and at the top of Sani Pass. It is widely distributed in Lesotho from Lebelonyane Pass in the south, east to the top of Sani Pass, north to Oxbow and Moteng Pass, and west to Blue Mountain Pass. Manning & Brothers (1986) reported *R. politissima* (= *R. neliana*) visiting several *Diascia* species on Sani Pass, including *D. barberae* on the Sani Flats in Lesotho. We have examined this material and found that they had a mixed sample, the specimens from Sani Flats being the new species, *R. pallidula*. At lower altitudes, 1 800 m to 2 400 m, this species is sympatric with *R. neliana* and shares the same oil and nectar plants.

Rediviva saetigera sp. nov.

Figs 5–9

Diagnosis

Integument black with light to dark brown pubescence, except on episternum and sternum where pubescence is white to cream. Female with long straight unbranched dark hairs with bent or curled tips on clypeus, frons and vertex, parted on a line with bases of antennae. Hairs on dorsal areas of front and middle tibiae and tarsae dark brown to black. Front legs short with no elongation of tarsomeres 2 to 4, long dense oil-collecting hairs on basitarsus and distal area of tibia. Glossa short, circular. This is the only *Rediviva* known in the summer rainfall area with short front tarsomeres and with oil-collecting hairs on the front basitarsus and tibia only.

Type locality

Transvaal, road to Lydenburg, 11,6 km south-west of Sabie, 2530BB, collected on flowers of *Bowkeria cymosa* (Scrophulariaceae).

Etymology

Saetiger, Latin for 'bearing bristles', which refers to the pollen-collecting hairs on the clypeus, frons and vertex of females.

Material examined

Type material. Holotype: SAM-HYMB0003, female, 11,6 km south-west of Sabie, 2530BB, V. B. Whitehead, 30 Jan. 1988. *Allotype:* SAM-HYMB0004, male, Graskop, God's Window, 2430DD, V. B. Whitehead, 2 Mar. 1990. *Paratypes* (46 ♀♀, 13 ♂♂)—*Cape Province:* 1 ♀, Ocean View Farm, East London, 3228CA, K. E. Steiner, 19 Jan. 1986; *Natal, Kwazulu:* 1 ♀, 52,6 km north-west of Eshowe, 2831CA, V. B. Whitehead, 13 Jan. 1989; 2 ♀♀, Nkandla Forest, 56,9 km north-west of Eshowe, 2831CA, V. B. Whitehead, 13 Jan. 1989; 1 ♀, Nkandla Forest, 66,8 km north-west of Eshowe, 2831CA, V. B. Whitehead, 14 Jan. 1989; 1 ♀, road to Nkandla, km 38, 2831CA, K. E. Steiner, 13 Jan. 1989; 3 ♀♀, Road to Nkandla, km 38, 2831CA, K. E. Steiner, 14 Jan. 1989; 2 ♀♀, road to Nkandla, km 38, 2831CA, K. E. Steiner, 1989; *Transvaal:* 2 ♀♀, Barberton, 25,5 km east of Road 38 on road to Havelock, 2531CB, V. B. Whitehead, 4 Mar. 1990; 1 ♀, Barberton, 9,3 km east off Road 38 on road to Havelock, 2531CB, K. E. Steiner, 4 Mar. 1990; 1 ♀, Barberton, 19,3 km, east off Road 38 on road to Havelock, 1 270 m, 2531CD, V. B. Whitehead, 4 Mar. 1990; 1 ♀, Barberton, 31,8 km east off Road 38 on road to Havelock, 2531CB, K. E. Steiner, 4 Mar. 1990; 5 ♀♀, Graskop, God's Window, 1 710 m, 2430DD, V. B. Whitehead, 2 Mar. 1990; 1 ♂, Kaapsehoop, Berlin State Forest, 2530DA, V. B. Whitehead, 31 Jan. 1988; 2 ♀♀, Long Tom Pass, 1 690 m, V. B. Whitehead, 14 Feb. 1987; 1 ♀, Long Tom Pass, 1 590 m, V. B. Whitehead, 16 Feb. 1987; 1 ♂, Pilgrim's Rest, Vaalhoek Road, 1 280 m, 2530DD, V. B. Whitehead, 2 Mar. 1990; 4 ♀♀, 0,5 km west of turn off to Pilgrim's Rest on Sabie Road, 2530DD, K. E. Steiner, 4 Mar. 1986; 7 ♀♀, 10,7 km west of Sabie, 1 350 m, 2530BA, K. E. Steiner, 3 Mar. 1986; 4 ♀♀, 11,6 km west of Sabie, 1 350 m, 2530BA, K. E. Steiner, 5 Mar. 1986; 4 ♀♀, 11,6 km west of Sabie, 1 500 m, 2530BA,

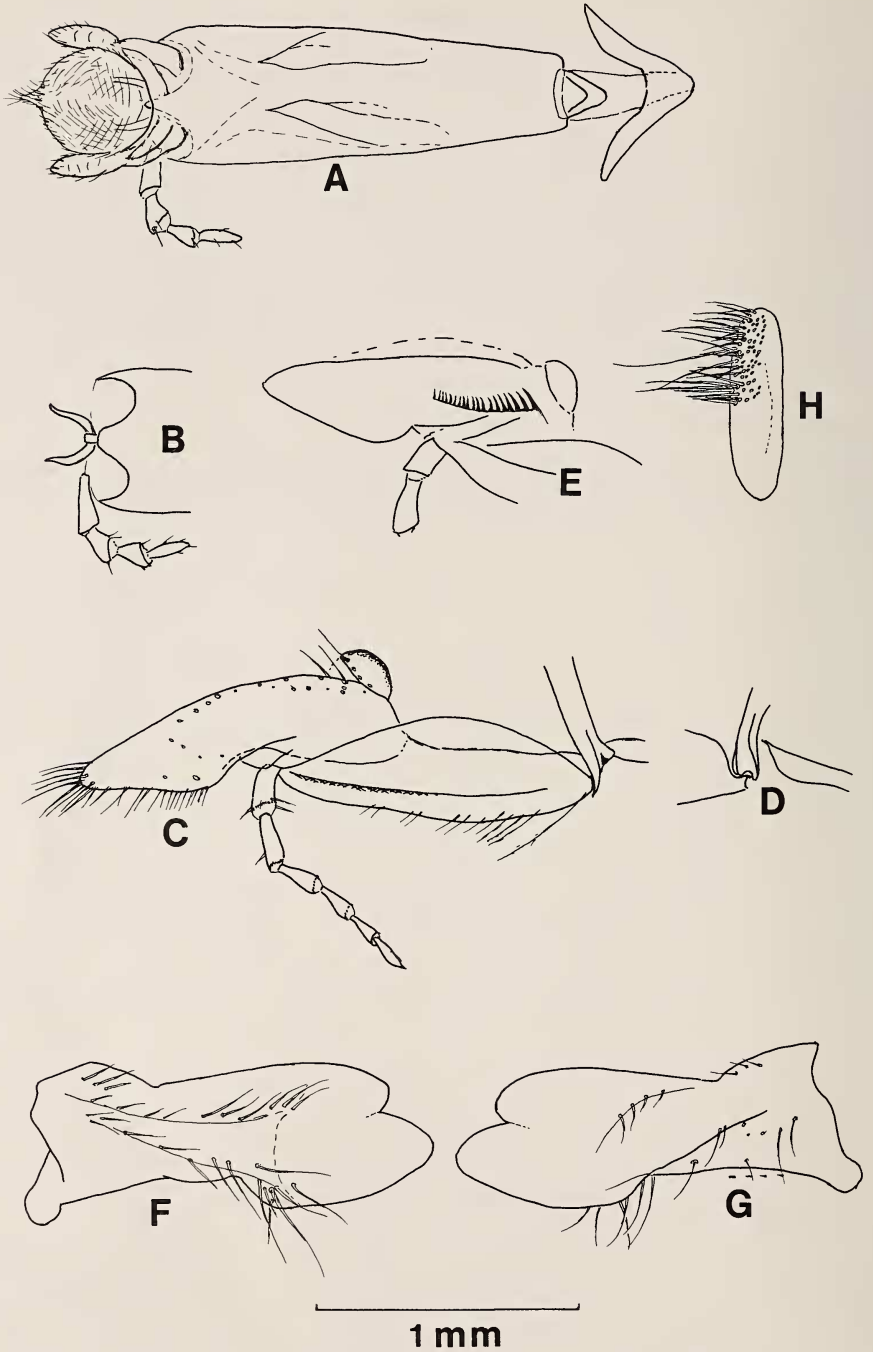


Fig. 6. *Rediviva saetigera* sp. nov. Female mouth-parts. A. Anterior view of labium. B. Distal part of labium, posterior view to show subligular process and basiglossal sclerite. C. Maxilla, outer view. D. Basistipital process. E. Inner view of maxilla to show galeal comb. F-G. Right mandible, outer and inner views.

K. E. Steiner, 30 Jan. 1988; 1 ♀, 11,7 km west of Sabie, 1 500 m, 2530BA, K. E. Steiner, 15 Feb. 1987.

Other material. (68 ♀♀)—*Natal, Kwazulu*: 21 ♀♀, Nkandla, 2831CA; *Transvaal*: 5 ♀♀, Barberton, 2531CD; 7 ♀♀, Graskop, 2430DD; 2 ♀♀, Kaapsehoop, 2530DA; 5 ♀♀, Pilgrim's Rest, 2430DD; 28 ♀♀, Sabie, 2530BA.

Description

Female

Measurement and ratios. Holotype, body 10,0 mm, forewing 9,5 mm; other material in Table 3.

Integumental colour. Black, mouth-parts, scape and first flagellar segment black with dark brown extremities, rest of flagellum dark brown, lighter on under-side; front tarsae, middle and hind tibiae dark brown; tegulae light brown; wings lightly tinted with brown, stigma and veins brown except R and M+Cu which are black.

Structure. Head wider than long, holotype 3,6:3,25 mm, other material 3,6 : 3,0 mm (n = 20) (Table 4); inner orbits of eyes converging above and below, interocular distance greater than length, holotype 3,3:2,9 mm; interior distance between the lateral ocelli greater than ocellocular distance; malar space narrow, length one-eighth of width (holotype), other material in Table 4; mouth-parts

TABLE 3

Mean lengths (\pm SD) of forelegs, body, foreleg/body ratios and forewings of females (n = 25) and males (n = 8) of *R. saetigera* from the eastern Transvaal and Nkandla, Natal.

<i>Eastern Transvaal</i>				
	Females		Males	
	Length (mm)	Range (mm)	Length (mm)	Range (mm)
Foreleg	08,3 \pm 0,17	07,9–08,6	07,8 \pm 0,28	07,5–08,5
Body	10,9 \pm 0,70	09,7–12,5	09,0 \pm 0,35	08,5–09,7
Foreleg/body	0,76 \pm 0,04	0,66–0,81	0,87 \pm 0,28	0,80–0,90
Forewing	09,1 \pm 0,22	08,8–09,5	08,8 \pm 0,19	08,5–09,0
<i>Nkandla</i>				
	Females			
	Length (mm)	Range (mm)		
Foreleg	08,2 \pm 0,12	08,0–08,4		
Body	10,3 \pm 0,37	10,0–11,2		
Foreleg/body	0,80 \pm 0,04	0,73–0,85		
Forewing	08,9 \pm 0,26	08,3–09,2		

TABLE 4

Mean measurements (\pm SD) of head width (HW), head length (HL), interocular distance (IOD), eye length (EL), and the length/width ratio of the malar space (MS-L/W) of *R. saetigera* females (n = 20) and males (n = 8) from all areas.

	HW (mm)	HL (mm)	IOD (mm)	EL (mm)	MS-L/W
Females	3,6 \pm 0,08	3,0 \pm 0,09	2,5 \pm 0,06	2,2 \pm 0,07	0,11 \pm 0,02
Range	3,4-3,8	2,8-3,1	2,3-2,6	2,1-2,3	0,07-0,20
Males	3,4 \pm 0,09	2,7 \pm 0,10	2,3 \pm 0,07	2,1 \pm 0,09	0,12 \pm 0,02
Range	3,3-3,6	2,6-2,9	2,2-2,4	2,0-2,3	0,08-0,15

(Fig. 6A), glossa short, circular with short apical projection, paraglossae short not extending beyond glossal extremity; labial palps extending beyond apex of glossa, segments 2 and 3 broader at apex; ligular arms occupying middle third of prementum; premental fragmentum, proximal part of mentum and lorum sclerotized, posterior ligular process and basiglossal sclerite as in Figure 6B; cardo slightly shorter than stipes, stipes 3,5 times as long as wide, posterior margin with scattered long plumose hairs (Fig. 6C); basistipital process short (Fig. 6D); maxillary palps extending beyond galea, first two segments subcylindrical, following three broader distally; galea with rounded apex, with hairs along apical and posterior margins, galeal comb large with 19 teeth (Fig. 6E); mandibles (Fig. 6F-G) strongly curved, stout preapical and apical tooth, cap of rutellum occupying about one-third of mandible; labrum narrow, about 3,5 times as wide as long, rounded laterally with dense long hairs on anterior half, hairs shortening posteriorly (Fig. 6H); antennae with first flagellar segment less than half length of scape (excluding pedicellus), approximately as long as segments 2 plus 3, segments 4-9 subequal and as long as broad, segment 10 one-and-a-half times longer than broad. Front legs short, not attenuate, sum of tarsomeres 2, 3 and 4 less than one-quarter of leg length, similar in shape to tarsomeres of middle and hind legs (Fig. 7A-B); hind legs with basitarsus trapezoidal in outline (Fig. 7C); tibial spurs light brown, finely dentate. Wings (Fig. 8A) with second submarginal cell one-and-a-half times broader than long, receiving first recurrent vein beyond middle (19:10), third submarginal cell more than twice as broad as long, receiving second recurrent vein beyond middle (22:17), basal vein more than twice as long as first abscissa of Rs, joining Cu slightly distal to Cu-V; jugal lobe of hind wings slightly more than half length of vanal lobe (34:62); ten hamuli. Propodeal triangle small, shiny, devoid of hairs, distinguishable from adjacent propodeal surface which is coarsely punctate reticulate, small area at base of triangle finely rugose. Apical margins of S2, S3 and S4 produced to a point in midline giving the margin a biconcave appearance; gradulus on S2 bisinuate (Fig. 7D). Pygideal plate punctate, dull.

Sculpture. Head: clypeus and frons coarsely punctate, area between punctures less than diameter of punctures, surface area between punctures finely reticulate, small area adjacent to lateral ocelli, shiny, impunctate or with isolated punctures, finely reticulate towards occipital ridge. Mesosoma: large shallow punctures on scutum

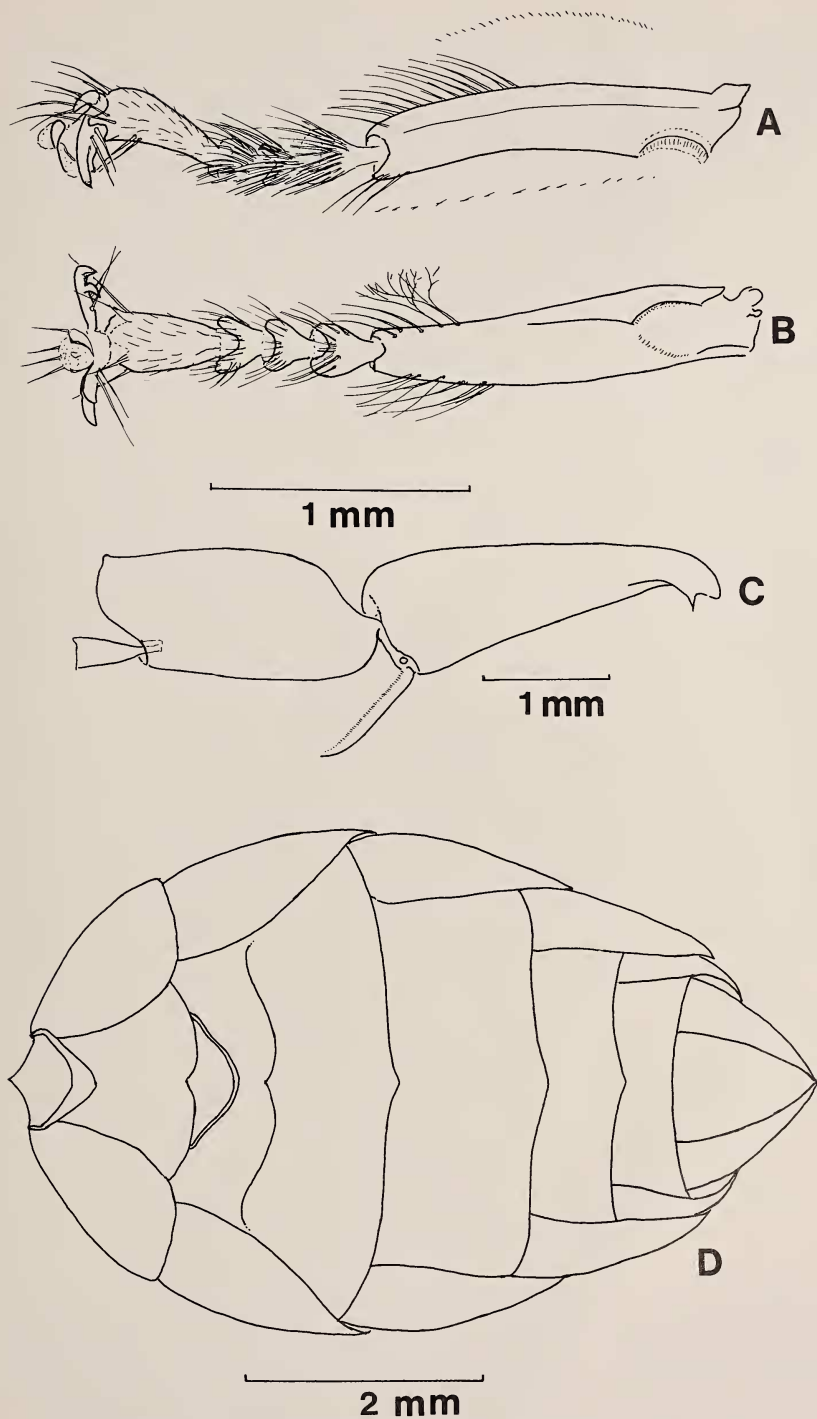


Fig. 7. *Rediviva saetigera* sp. nov. Female. A. Foreleg, lateral view. B. Foreleg, ventral view. C. Hind tibia and basitarsus (hairs removed). D. Ventral view of metasoma.

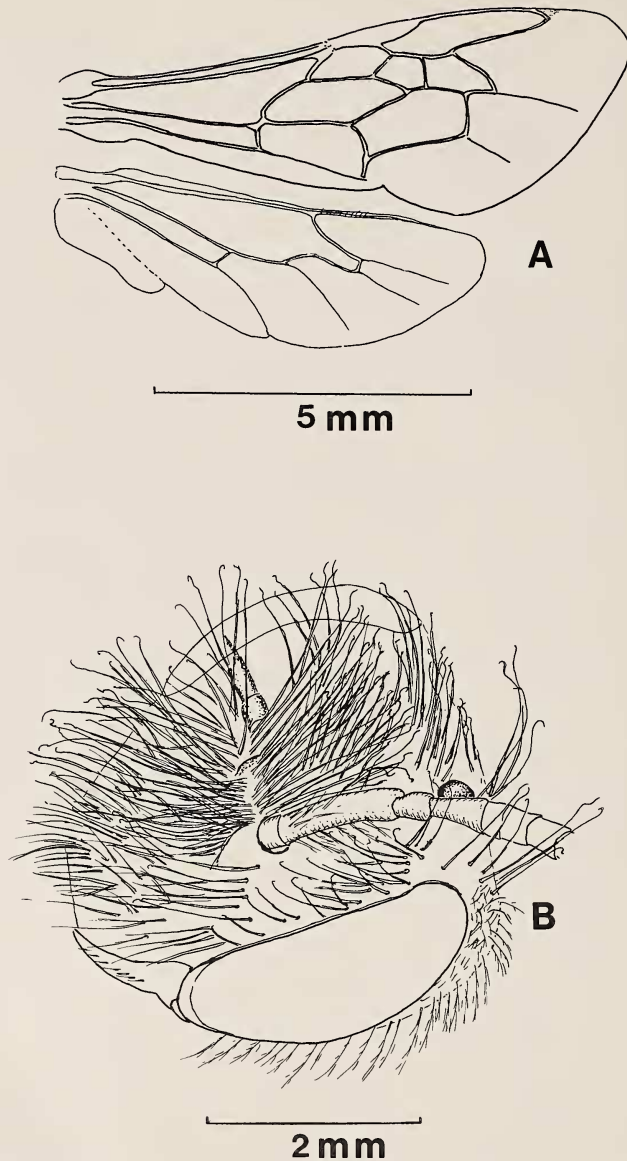


Fig. 8. *Rediviva saetigera* sp. nov. Female. A. Right wings. B. Head, to show long unbranched pollen-collecting hairs.

with whole surface finely granulate; punctures coalescing on scutellum becoming scaly-reticulate; punctures finer on metanotum with areas between punctures shiny; punctures on mesepisternum elongate, tending to coalesce, surface finely granulate. Metasoma: T1 shiny, sparsely punctured, T2 to T4 punctate, areas between punctures finely granulate, apical margins impunctate; S2 to S4 more coarsely punctured, apical margins impunctate, shiny.

Vestiture. Head: long, unbranched stout black hairs between bases of antennae, on supraclypeal area and down to just before anterior clypeal margin, shortening anteriorly, parting at bases of antennae, hairs below antennal bases point forward and above point backward (Fig. 8B), similar hairs on occiput between lateral ocelli and in ocellular area point forward, ends of hairs taper finely to a sinuate or curved point; finely branched white hairs at base of scape; hairs on mandibles and labrum reddish-brown, on under-side of head long, white and plumose. Mesosoma: margins of scutum and scutellum densely covered in light brown hairs mingled with sparse black hairs, disc of both areas with fine decumbent hairs; metanotum covered with light brown hairs, paler on margins; propodeum (except triangle), episternum and sternum densely covered with finely branched pale brown to white hairs; fore- and middle legs with black hairs on basitarsus, tibia and anterior part of femur, dark brown ventrally, hairs on front legs longer on both tibia and basitarsus, where unmodified hairs have an under-storey of finely branched oil-collecting hairs; hind legs with dark hairs on base of tibia and apex of basitarsus, sparse black and numerous long brown hairs protruding through mat of fine brown hairs on anterior face of tibia and basitarsus, posterior surface covered in stout brown hairs, hairs on distal margin of basitarsus parted to form a penicillum. Metasoma: decumbent light brown hairs on apical two thirds of T2, T3 and T4, basal hairs paler, short on disc, longer laterally, isolated erect black hairs basally on T4; T5 and T6 with long black hairs on apical margins; long pale hairs on apical margins of S2, S3 and S4, black on S5.

Male

Measurement and ratios. Allotype, body 9,0 mm, forewing 8,7 mm; other material in Tables 3–4.

Integumental colour. Black, except extremities of mouth-parts, under-side of antennal flagellum, tarsae, tibial apices, tibial spurs and tegulae, which are brown; stigma and veins brown except R and M+Cu, which are black.

Structure. Head wider than long (3,4:2,7 mm); inner orbits as in female, distance between eyes greater than length of eye (2,3:2,1), ocellular distance equal to inner distance between lateral ocelli; malar space short ($L:W = 3:28$); first flagellar segment of antenna short, less than half length of scape, shorter than successive flagellar segments. Forelegs not modified, hind tibia slightly wider than basitarsus (15:12), tibial spurs brown, finely serrated, basitibial plate small, twice as long as wide, basal three-quarters covered with hairs. Wings with whole surface papillate, venation, jugal and anal lobes as in female. Propodeal triangle as in female. Apical margins of S3, S4 and S5 pointed in middle giving margin a biconcave outline, concavities deepest on S5; S6 (Fig. 9A) shiny on disc with scattered black hairs, apical and lateral lobes small, lateral lobes with dense black hairs; apical lobes on S7 short with sparse hairs on distal margins, lateral lobes large, crescent-shaped in lateral view, papillate, particularly on lower part (Fig. 9B–C); tip of S8, viewed from above, shiny, oval with a single emargination (Fig. 9D–F). Genitalia (Fig. 9G–H) with gonostyli narrow and keeled below, with large translucent flange on upper surface basally; volsellae distinct with teeth on opposing surfaces, opening lateroventrally.

Sculpture. As in female.

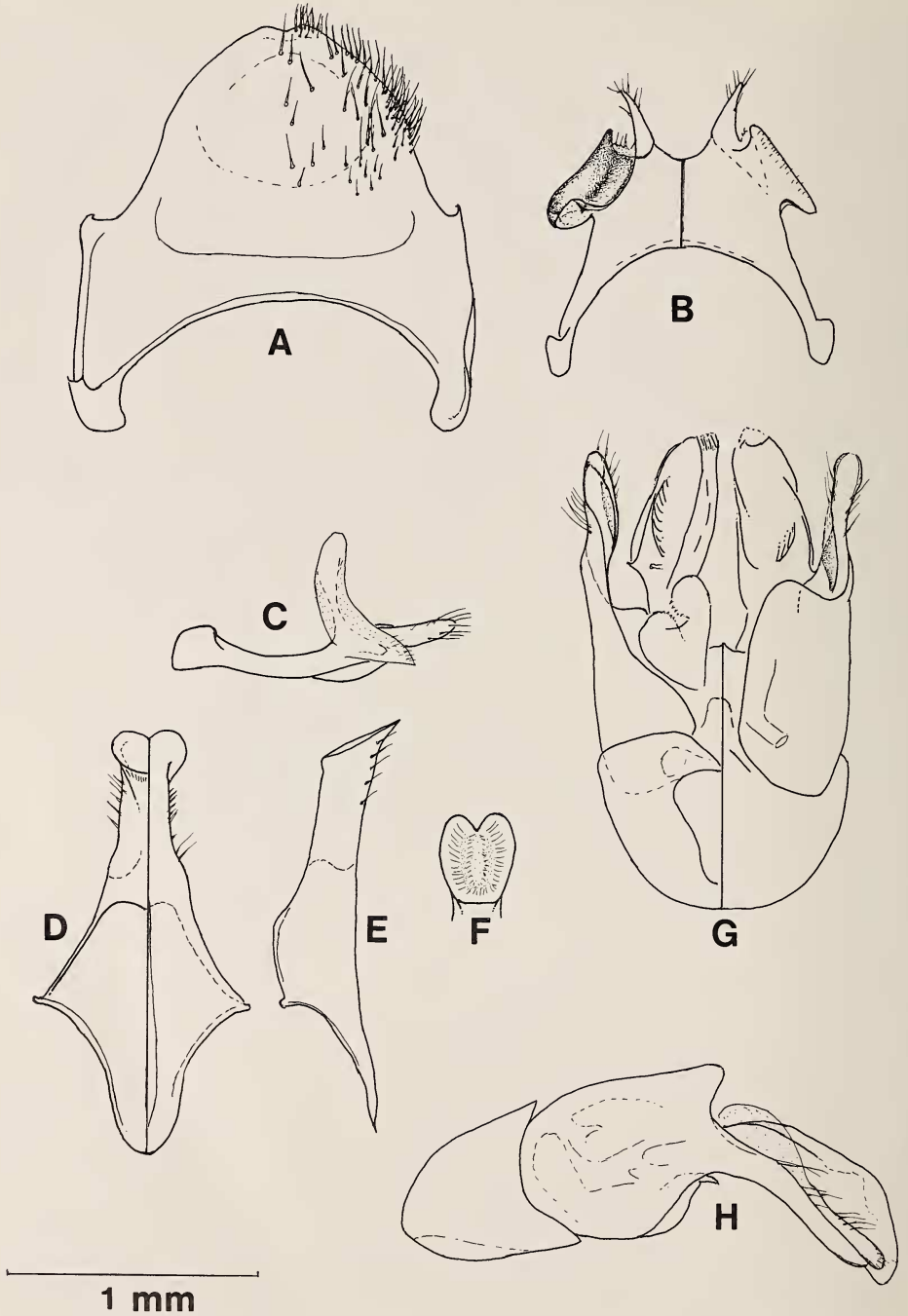


Fig. 9. *Rediviva saetigera* sp. nov. Male genitalia and associated sterna. A. S6. B. S7, dorsal view (left), ventral view (right). C. S7, side view. D. Dorsal and ventral view of S8. E. S8, lateral view. F. Tip of S8, dorsal view. G. Genital capsule, ventral (left) dorsal (right). H. Genital capsule, lateral view.